Teacher Resource 3.1

Presentation 1 Notes: Evolution of Networks

Develop presentation notes in the right hand column based on the slides and text in the left hand column. Write two things you learned or think are important about each slide.

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| C:\Users\Mika\Documents\My Documents\Pearson\2013\June\23\Networking_Lesson3_Presentation1_ROOT_062513\Slide1.JPG  This presentation introduces the history of networking from the first visual networks (optical telegraphy) to digital and radiotelegraphy, to telephone and broadcast media such as radio and television, and finally to cellular phones and the Internet. | Presentation notes |
| C:\Users\Mika\Documents\My Documents\Pearson\2013\June\23\Networking_Lesson3_Presentation1_ROOT_062513\Slide2.JPG  We use networks because they’re fun and convenient: they entertain us and also help us out. Sometimes they’re necessary in emergencies to get us help.  Say you really are stranded on a desert island. How can you communicate with the outside world, and what types of communication are best? You’d need a network that is easy to use, with resources that you have on hand. You might not have satellite Internet, but maybe you can make a fire and send smoke signals to nearby ships. Your signal needs to be reliable, too, so that someone is sure to see or find the message! Also, you need to act quickly so that you don’t starve to death from eating only coconuts.  Computer networks operate on the same principles: they help us live more easily and conveniently, but they’re useful in emergency situations, too. That’s because they’re reliable, fast methods of communicating a message across a long distance. | Presentation notes |
| C:\Users\Mika\Documents\My Documents\Pearson\2013\June\23\Networking_Lesson3_Presentation1_ROOT_062513\Slide3.JPG  Networks based on visual signals date back at least as far as ancient Greece, when people used torches to communicate across town or across distances.  During the French Revolution, there was also an extensive relay network based on flag signals. The signaler would hold up flags in one location, and far off another person would look for and interpret the signals. The messaging process was slow, because each signal represented a different letter. It could take a minute to receive just one word. Another drawback was that these signals were limited by visual range: it was difficult to get a message over a hill or mountain, or even a tall building. And in heavy fog or rain, there was also no chance of communicating.  To cover long distances, cities would set up extensive relay systems, and a message would slowly travel from one tower or station to the next, until it eventually reached its destination. It was a bit like playing telephone tag, only much slower!  The picture shows an optical telegraph tower in Germany set up on a relay network that spanned 140 miles in the late 1700s.  Image retrieved from <http://commons.wikimedia.org/wiki/File:OptischerTelegraf.jpg> and reproduced here under the terms of the Creative Commons Attribution-ShareAlike 3.0 Unported license (<http://creativecommons.org/licenses/by-sa/3.0/deed.en>). Image courtesy of Lokilech. | Presentation notes |
| C:\Users\Mika\Documents\My Documents\Pearson\2013\June\23\Networking_Lesson3_Presentation1_ROOT_062513\Slide4.JPG  The telegraph is both an electric and mechanical device. It may seem archaic looking, but it can be a very efficient way to communicate. On NBC’s *The Tonight Show,* comedian Jay Leno once tested which was faster: the electric telegraph or cell phone text messaging. He brought a team of the fastest SMS messagers and another team of two experienced telegraph operators, and each operator competed in sending a message to his teammate. The telegraph operators came out faster than the cell phone texters! So, even though a technology is out-of-date, it doesn’t mean it’s no longer effective or useful. | Presentation notes |
| C:\Users\Mika\Documents\My Documents\Pearson\2013\June\23\Networking_Lesson3_Presentation1_ROOT_062513\Slide5.JPG  Before the telegraph, people in America relied on the Pony Express, the railroads, and ships to send written letters. Messengers were needed to deliver them across valleys and plains and mountain ranges. If there was severe weather, if a horse was hurt, or if a train broke down, the messages wouldn’t reach their destinations.  The telegraph was a revolutionary device because it broke down all those barriers and allowed people to communicate in real time and send messages using Morse code. Since it was developed in Victorian times and it was the first major digital network that allowed instant communications, it is sometimes called the “Victorian Internet” by people today.  Samuel Morse made the first public demonstration of his telegraph in 1838, but the first network wasn’t installed until a few years later. This is around the time when many different kinds of machines were being developed and the Industrial Revolution was gearing up. Many people were leaving their rural family farms to work in the big cities. Many worked long, grueling hours doing monotonous tasks under dangerous conditions, far away from their families and homes. Life was often rough for people, but the telegraph made it easier to talk with loved ones and conduct business across longer distances. | Presentation notes |
| C:\Users\Mika\Documents\My Documents\Pearson\2013\June\23\Networking_Lesson3_Presentation1_ROOT_062513\Slide6.JPG  The digital telegraph was an important technology, but its major drawback was that wires were needed to connect two points. Therefore, you couldn’t communicate across the ocean! A fellow named Marconi solved this problem in the 1890s. He helped develop the first wireless radios and managed to broadcast the first transatlantic radio message in 1901.  At the time, many people told him it was impossible because of the curvature of the earth—they believed that radio waves could travel only in straight lines and couldn’t go through the earth. But Marconi went ahead with his plan. He arranged to send a simple signal at a certain time on a certain day. Then he had to travel by ship across the Atlantic Ocean and set up a receiving station. On the set date, he sent aerial balloons and kites into the sky with wireless receivers attached. The balloons failed, and one of the kites was blown away, but he finally did receive the three dots representing the letter *s* in Morse code.  When the famed ship Titanic crashed, it had two telegraph operators on board. They sent out a distress call, and another ship sped to the rescue. The rescue ship saved 700 lives. The disaster made major headlines that prompted changes in the way radio was used. Previously, people could use any radio frequency they wanted for broadcast and turn their radios off when not in use. After the Titanic accident, the government began regulating the radio spectrum and passing regulations that required ships to dedicate one specific channel for emergency disaster calls. | Presentation notes |
| C:\Users\Mika\Documents\My Documents\Pearson\2013\June\23\Networking_Lesson3_Presentation1_ROOT_062513\Slide7.JPG  Radio broadcasting is a one-way wireless transmission over radio waves intended to reach a wide audience. Stations can be linked in radio networks to broadcast a common radio format, either in broadcast syndication or simulcast or both.  The early 1900s was the very beginning of the licensing and regulation of the radio spectrum. Today, all radio frequencies are highly regulated, so certain kinds of wireless devices can use only certain frequencies, and certain broadcasters (e.g., FM radio stations) have to purchase the right to broadcast at a certain frequency. With the advent of broadcast radio, it became very important to regulate the channels and ensure that only one station was broadcasting on each so that the signals wouldn’t interfere with each other.  Today the Federal Communications Commission (FCC) controls how different frequencies are used. When you tune in to your favorite radio station, you are setting your radio to listen in on a specific frequency along the electromagnetic spectrum. If the announcer says, “Welcome to KKPD, 90.5 FM,” that means the station is broadcasting at 90.5 megahertz (millions of cycles per second), and the FCC has assigned its call letters as KKPD. On AM radio, it is the same, except that the signal is broadcast in kilohertz—thousands of cycles per second instead of millions.  No matter whether it is AM, FM, or television, all waves in the electromagnetic spectrum travel at the speed of light: 186,000 miles per second. At this speed, a radio wave would travel around the earth 7 ½ times in 1 second. | Presentation notes |
| C:\Users\Mika\Documents\My Documents\Pearson\2013\June\23\Networking_Lesson3_Presentation1_ROOT_062513\Slide8.JPG  This is a diagram of the electromagnetic spectrum. Electromagnetic waves include visible light and radio signals. Electromagnetic waves are also different from sound waves that you may have studied. Sound waves are simple vibrations of matter in space, and what you hear is the movement of the molecules, or the way they bump into each other.  An electromagnetic wave is created when charged particles (in this case electrons) are moving. The speed at which the wave travels is independent of what kind of wave it is (x-rays, microwaves, radio, visible light) and depends on what medium it is moving through. In a vacuum, all electromagnetic waves travel at the same speed, but their frequency and wavelength vary. The radio works by translating the sound waves that you can hear into radio (electromagnetic) waves that can travel much farther. The radio announcer speaks into a microphone, and his voice vibrates against a receptor in the microphone. This receptor translates that vibration into electrical impulses and radio waves, which are broadcast through the antenna as AM or FM waves. When the antenna at your home radio (or in your car) receives the waves, it tunes out extra static and amplifies the signal as necessary and then converts it back into a vibration that you can hear. | Presentation notes |
| C:\Users\Mika\Documents\My Documents\Pearson\2013\June\23\Networking_Lesson3_Presentation1_ROOT_062513\Slide9.JPG  AM (amplitude modulation) was the first technology for broadcast radio; its use began in the 1920s. It changed people’s lives to be able to listen to their president give a speech or hear breaking news stories from across the country or sit around the living room and hear new music or entertaining radio shows. It was a medium for both information and entertainment. Families and friends often gathered around the radio to hear the broadcasts, much like they do for TV sitcoms today. Popular stories, such as those pulled from comic books or short fiction, were written into radio shows—like the Buck Rogers comic shown here. Ronald Reagan, the actor and former president, got his start on a radio show, as shown here in the black-and-white photo.  Early radio was all AM. FM radio, or frequency modulated radio, wasn’t invented until the 1960s, after television was already becoming popular.  FM provides better quality over a longer distance, so today it is more frequently used for music and other media that need good quality, while AM is more commonly used for talk radio shows. | Presentation notes |
| C:\Users\Mika\Documents\My Documents\Pearson\2013\June\23\Networking_Lesson3_Presentation1_ROOT_062513\Slide10.JPG  In the 1930s, TV changed America. Suddenly, people could see live coverage of political speeches or wars, see what their political leaders looked like, and get a firsthand view into what was actually occurring.  Every TV channel uses a few different bands of the spectrum, or frequencies, to send its signal. Because TV is transmitting both audio and visual signals, each signal is sent via a different frequency or channel. Both audio and video signals arrive at the TV at the same time.  At the TV, your antenna picks up the radio signal and translates it into something your TV set can understand. The audio signals are received in much the same way as FM radio sounds. The visual signals differ depending on whether it is a black-and-white or color TV. Today almost all television sets are color, of course. They receive all the color information in the same frequency or channel by phase-shifting the frequency of the wave. Each color is represented by a different amount of shift, and the TV can translate those shifts into a visual signal.  Modern television is broadcast digitally, so signals are less subject to noise and interference, and greater detail (high definition) is possible. | Presentation notes |
| C:\Users\Mika\Documents\My Documents\Pearson\2013\June\23\Networking_Lesson3_Presentation1_ROOT_062513\Slide11.JPG  Networks have evolved a lot in the past two millennia. And the future of networks seems even more promising. Later in this lesson, we will look at the past 50 years of networking with computers and the Internet. | Presentation notes |
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